CLAIMS

1. A system for observing the presence of at least one fluorophore in a test material to be used with a source of ultraviolet incident light comprising

a) a screen holder

b) a wavelength conversion screen receivable in and removable form said screen holder comprising a scintillator which absorbs light of ultraviolet wavelengths and emits light of a narrow bandwidth λ_{s1} to λ_{s2}; and

c) a test material comprising at least one fluorophore positioned such that light passing through the wavelength conversion screen is incident on the material, the fluorophore having an excitation wavelength λ_{dx}, in which $\lambda_{s1} < \lambda_{dx} < \lambda_{s2}$, and which emits lights at a wavelength λ_{dm} which is detectable by a detector.

2. A system according to claim 1 comprising the source of U.V. light.

3. A system according to claim 2 in which the source is a mercury vapour lamp.

4. A system according to claim 2 in which the light source is a transilluminator and wherein the wavelength conversion screen, and the test material are arranged sequentially on the transilluminator whereby light passes through each of them.

5. A system according to claim 1 wherein the band width $\lambda_{s2} - \lambda_{s1}$ is less than 100 nm.

6. A system according to claim 5 wherein the bandwidth $\lambda_{s2} - \lambda_{s1}$ is in the range 10 to 75 nm.

7. A system according to claim 1 wherein λ_{dx} is in the range 370 - 720 nm.

8. A system according to claim 1 wherein the value of Δd where $\Delta = \lambda_{dx} - \lambda_{s2}$, is less than 100 nm.

9. A system according to claim 1 in which the fluorophore/scintillator combinations are selected from the combinations in Table 1.

10. A system according to claim 1 in which the wavelength conversion screen absorbs lights of wavelength less than λ_{s1} whereby substantially no light of such wavelengths is incident on the test material.

11. A system according to claim 1 in which the test material has at least two fluorophores distributed in it, each of which has an absorption maximum in the range λ_{s1} to λ_{s2} and which have different emission wavelengths λ_{dx}.

12. A system according to claim 1 in which the test material has a second fluorophore distributed in it which has an absorption envelope λ_{db} outside the range λ_{s1} to λ_{s2}, wherein the system further comprises a second wavelength conversion screen which may be exchanged with the said wavelength conversion screen in the said screen holder and which comprises a second scintillator which absorbs light of UV wavelength and emits light at a higher wavelength λ_{dbm} in the range λ_{sb1} to λ_{sb2}, the second scintillator selected such that $\lambda_{sb1} < \lambda_{db} < \lambda_{sb2}$.

13. A system according to claim 12 in which the absorption maximum within λ_{db} is within about 10 nm of λ_{dm}.

14. A system according to claim 1 in which the detector is the human eye.

15. A system according to claim 1 in which the detector is an automated device and is a component of the system.

16. A system for observing the presence of a fluorophore in a test material comprising

a) a source of ultraviolet light which is a mercury vapour lamp;

b) a holder for a screen;

c) an exchangeable wavelength conversion screen adapted to be receivable in the screen holder and to be removable therefrom, and comprising a scintillator which absorbs light of ultraviolet wavelengths and emits light of a narrow bandwidth λ_{s1}-λ_{s2} where the bandwidth λ_{s2}-λ_{s1} is less than 100 nm;

d) a support for a test material;

e) a test material which comprises a fluorophore having an excitation wavelength λ_{dx} and an emission wavelength λ_{dm}; and

f) a detector capable of detecting light of wavelength λ_{dm};

wherein the support allows the test material to be positioned on the opposite side of the screen to the light source and the detector is located on the side of the test material opposite to the screen.

17. The system of claim 16 in which the screen comprises in sequence a substrate which is transparent to ultraviolet light, a wavelength converting layer which comprises the scintillator and a protective layer overlying the wavelength converting layer which is transparent to light of wavelength in the range λ_{s1}-λ_{s2}.

18. The system of claim 16 in which the scintillator comprises a luminescent centre selected from the group consisting of Ce^{3+}/Tb^{3+}, Tb^{3+}, Mn^{4+}, Tl^{+}, Eu^{2+}, Tm^{3+}, Rm^{3+}, Mn^{2+}, Dy^{3+} and Eu^{3+}.

19. The system according to claim 18 which comprises a matrix in which the luminescent centre is included, selected from the group consisting of $CeMgAl_{11}O_{19}$, Y_2O_2S, Gd_2O_2S, $LaPO_4$, Y_5SiO_5, $GdMgB_5O_{10}$, $(CaZn)_3(PO_4)_2$, SrB_4O_7, $(SrMg)_2P_2O_7$, YVO_4, and $MgGa_2O_4$.

20. The system of claim 19 in which the scintillator comprises a Tm^{3+} centre and an yttrium vanadate YVO_4 matrix.

21. A method for observing the presence of at least one fluorophore in a test material using a detector comprising the steps:

a) providing an exchangeable wavelength conversion screen comprising a scintillator which absorbs light of ultraviolet wavelengths and emits light of a narrow band width λ_{s1}-λ_{s2};

b) directing incident ultraviolet light through the wavelength conversion screen whereby light having a wavelength in the range λ_{s1} to λ_{s2} is transmitted through the screen;

c) providing a test material, which comprises a fluorophore which absorbs light at an excitation wavelength around a maximum λ_{dx}, in which $\lambda_{s1} < \lambda_{dx} < \lambda_{s2}$, and emits light at a wavelength λ_{dm};

d) causing the transmitted light of wavelength in the range λ_{s1}-λ_{s2} to pass into said test material whereby the fluorophore emits light at said wavelength λ_{dm}; and

e) detecting said emitted light using a detector system which is sensitive to light of wavelength λ_{dm}.

22. The method of claim 21 in which λ_{s2}-λ_{s1} is less than 100 nm.

23. The method of claim 21 in which in which the fluorophore/scintillator combinations are selected from the combinations in Table 1.

24. The method of claim 21 in which the test material has at least two fluorophores distributed in it, each of which has an absorption maximum in the range λ_{s1} to λ_{s2} and which have different emission wavelengths λ_{dm}.

25. The method of claim 21 in which the test material has a second fluorophore distributed in it which has an absorption envelope λ_{db} outside the range λ_{s1} to λ_{s2} wherein the method further comprises

f) providing a second wavelength conversion screen which comprises a second scintillator which absorbs light of UV wavelength and emits light at a higher wavelength λ_{dbm} in the range λ_{sb1} to λ_{sb2}, the second scintillator selected such that $\lambda_{sb1} < \lambda_{db} <_{sb2}$;

g) exchanging the first screen for the second screen;

h) directing incident ultraviolet light through the second wavelength conversion screen whereby light having a wavelength in the range λ_{sb1} to λ_{sb2} is transmitted;

i) causing the transmitted light having a wavelength in the range λ_{sb1} to λ_{sb2} to pass into the test material, whereby the second fluorophore emits light of wavelength λ_{dbm}; and

j) detecting said emitted light of wavelength λ_{dbm} using a detector which is sensitive to light of wavelength λ_{dbm}.

26. The method of claim 21 in which the scintillator comprises a luminescent centre selected from the group consisting of Ce^{3+}/Tb^{3+}, Tb^{3+}, Mn^{4+}, Tl^{+}, Eu^{2+}, Tm^{3+}, Rm^{3+}, Mn^{2+}, Dy^{3+} and Eu^{3+}

27. The method of claim 26 in which the luminescent centre is incorporated into a matrix selected from the group consisting of $CeMgAl_{11}O_{19}$, Y_2O_2S, Gd_2O_2S, $LaPO_4$, $Y_5S_1O_5$, $GdMgB_5O_{10}$, $(CaZn)_3(PO_4)_2$, SrB_4O_7, $(SrMg)_2P_2O_7$, YVO_4, and $MgGa_2O_4$.

28. The method of claim 26 in which the scintillator comprises a Tm^{3+} centre and an yttrium vanadate YVO_4 matrix.

29. The method of claim 21 in which the fluorophore is selected from the group consisting of Pyrene, AMCA, Cascade Blue, Diethylaminocoumarin, Fluorescein (FAM), BODIPY FL, SYBR Green I, SYBR Green I, Acridine Orange, Rhodamine 110, Oregon Green 488, Alexa 488, Rhodamine Green, Eosin, Alexa 532, 2',7'-Dimethoxy-4',5'-dichloro-6-carboxyfluorescein (JOE), Naphthofluoroscein, Alexa, Ethidium bromide, Cy3, Tetramethylrhodamine, Rhodamine 6G, Alexa 568, Lissamine, Rhodamine, Rhodamine Red, Carboxy-X-rhodamine (ROX), Texas Red, Fluorophore label, BODIPY TR, BODIPY 630/650, BODIPY 650/665, Cy5, Rhodamine 800 and Oxazine 750.

30. The method of claim 21 in which the fluorophore is fluorescein.

31. The method of claim 27 in which the fluorophore is fluorescein.